



IMPACT OF DIGITAL TRANSFORMATION ON THE PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES IN NAGPUR DISTRICT

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ABSTRACT

Digital transformation has had a major impact on MSMEs, enhancing communication, payments, accounts and compliance, credit access, and market participation. This study involves secondary data obtained from government sources like the Ministry of MSME, TRAI, RBI, GSTN, the Ministry of Finance, and Parliament records from 2013 to 2023, which are considered for the impact on MSMEs of the Nagpur district. The study assesses the progress of digital transformation based on the number of enterprise registrations, internet access, digital payments, and institutional credit indicators. By December 2023, the number of registered Udyam units in Nagpur had risen from traditional to 162,790, comprising 157,865 micro, 4,407 small, and 518 medium enterprises. There were also significant increases in internet subscription and UPI transactions in India during this time. Districts in Maharashtra have a positive correlation between Udyam registrations and PMMY loan accounts, as revealed by the statistical analysis. The results indicate that the digital transformation had a positive effect on the formalization of the enterprise, the efficiency of payments, access to the market, and access to credit. But issues like digital skills, cybersecurity hazards, affordability, and connectivity shortages remain to hinder inclusive digital growth.



KEYWORDS: Digital Transformation, Smes, Msmes, Nagpur District, Udyam Registration, Digital Payments, UPI, Broadband, Enterprise Performance, Digital Finance

1. INTRODUCTION

Small and medium enterprises (SMEs) play a key role in employment creation, local production, entrepreneurship, regional development, and involvement in the supply chain. The term "MSMEs" in India also covers micro, small, and medium enterprises, and since microenterprises are dominant in the registered enterprises of Nagpur, this study focuses on SMEs as a whole rather than focusing on MSMEs as a separate category.

Digital transformation is more than just using computers or building a website. It incorporates digitization, digitalization, and the incorporation of digital technologies into business processes, customer relations, decision-making, and business models. Cloud accounting, digital payments, e-commerce, online taxation, digital marketing, and data-based lending are examples of technologies that can lower transaction costs, make better use of time, open up new markets, and increase access to institutional finance. But factors like funding constraints, lack of expertise, security, and connectivity issues are limiting the adoption in small businesses.

The city of Nagpur offers a suitable environment for studying the digital transformation because of the diversity of its industries, such as food processing, engineering, transport, retail, and service industries. A significant change during 2013-2023 is the rapid expansion of the Internet, the introduction of UPI, the growth of the Government e-Marketplace, the digitization of GST, etc., and the launch of Udyam Registration. These changes enabled business continuity and formalization, particularly during COVID-19.

This study conceptualizes SME performance based on enterprise formalization and access to credit, transaction capability, market reach, and resilience. The study outlines correlations between digital transformation and business performance but doesn't draw direct causal relationships, as there is limited enterprise-level data on sales, profits, productivity, and employment.

2. Objectives of Research

- 1) To explore the scope and key elements of digital transformation for SMEs.
- 2) To analyze the industrial & enterprise registration status of Nagpur at the beginning & end of the period 2013 to 2023.
- 3) To study the growth of the internet, broadband, formalization for internet transactions, and digital payment infrastructure in the context of Nagpur SMEs.
- 4) To assess the growth and the composition of the enterprises registered under Udyam in the city of Nagpur in 2023.
- 5) To explore the correlation between digital enterprise formalization and institutional credit availability among the districts of Maharashtra.
- 6) To evaluate the potential impact of digital transformation on transaction efficiency, financial inclusion, financial enterprise resilience, and access to the market.
- 7) To pinpoint barriers to SME digital transformation and recommend suitable policy and managerial options.

3. Hypotheses of Research

- **H₀:** There was little or no significant growth in the digital-enabling infrastructure in India in 2013-2023. Internet subscriptions grew at 10% or less, and broadband subscriptions grew at 20% or less, in terms of compound annual growth rates (CAGRs), at the operation level.
- **H₁:** Infrastructure to enable digitalization has significantly grown in India, and Internet and broadband have increased beyond the specified targets.
- **H₀:** There was no more than a 25% rise in the number of digitally registered MSMEs in Nagpur during the year 2023.
- **H₁:** The number of MSMEs in Nagpur who are digitally registered grew by over 25% in 2023.
- **H₀:** No statistically significant positive association between the number of MSMEs digitally registered and institutional microcredit accounts can be found among the districts of Maharashtra.
- **H₁:** The relationship between districts and institutional microcredit accounts and the digitized MSMEs is statistically significant and positive.

The first two hypotheses' threshold percentages are researcher-set analytical cut points and not government standards.

4. Research Methodology

The research design in this study is descriptive, comparative, and analytical, which is secondary data research for 2013-2023. The study area is the Nagpur district, and comparative data is available from Maharashtra districts. Data were gathered from the reports of the MSME, TRAI publications, digital payment records, PMMY records, and academic literature. The internet, internet access growth, digital payment, online registrations, and digital platforms were used to measure digital transformation. The indicators of SME performance were formalization, credit access, efficiency in transactions, and market reach. CAGR, Pearson correlation, Spearman correlation, and log-transformed analysis were used for the statistical analysis. In our opinion, the following are limitations: differences in registration systems, lack of enterprise-level performance data, and the inability to make a direct cause-and-effect claim.

5. Theoretical Framework

This study is based on various theories that explain the relationship between digital transformation and SME performance. The Resource-Based View (RBV) states that competitive advantage is more than just about technology; it is also about valuable internal resources like employee talent, management dedication, and knowledge of customer and digital strategy. Hence, the need of the hour is for the Nagpur SMEs to have complementary capabilities to derive business benefits from digital tools.

The dynamic capabilities perspective emphasizes the need for firms to continuously adjust to the changing digital context. Digital transformation is seen as a continuous program of opportunity identification, technology purchase, and business model enhancement, not a one-shot deal.

The TOE (Technology–Organization–Environment) framework is an explanation of the adoption of digital technology. Among SMEs, the usefulness, affordability, and security of the technology; managerial support; financial capacity; competition; and government initiatives affect decisions on adoption.

The transaction-cost perspective implies that digital platforms lower costs for businesses due to better communication, payment, record keeping, customer access, and procurement. Digital platforms can, however, also generate new costs in the form of service fees and dependency.

Last but not least, the digital business-model framework illustrates how technology can impact the processes of value creation, delivery, and revenue generation. The best results can be achieved when digital tools come together with organizational changes, strategic planning, and business-model innovation for SMEs. All these frameworks present a story about how digital transformation and SME performance are related in Nagpur.

6. Data Analysis and Interpretation

6.1 Opening industrial position of Nagpur

Table 1
Reported industrial indicators near the beginning of the study period

Indicator	Reported value
Registered units in cumulative DIC series	10,228
Employment	106,119 persons
Investment	₹148,349 lakh
Investment converted into crore	₹1,483.49 crore
Reported small-scale industry turnover	₹901,209 lakh
Turnover converted into crore	₹9,012.09 crore
Average employment per registered unit	10.38 persons
Average investment per registered unit	₹14.50 lakh
Industrial areas	12

Source: Author's calculations from the Ministry of MSME's Brief Industrial Profile of Nagpur District.

Figures indicate that Nagpur had a fairly large share of small enterprises at the start of the period. Ten people, on average, were employed at each registered business, indicating that a typical business may be small and likely have limited resources for undertaking complex technological initiatives. Meanwhile, over 100,000 employees and 12 industrial complexes provided enough bulk to make common digital-service providers, accounting companies, software suppliers, and training centers happen.

The district profile also included the computer-related business activity and the identification of information-technology and software business activities in Nagpur. The local service base was significant because the technology suppliers in the area can have enhanced capability to implement at lower cost and offer maintenance, training, and customized applications to smaller technology suppliers.

6.2 Expansion of the digital-enabling environment

Table 2
Growth of selected digital-enabling indicators

Indicator	Opening value	Closing value	Total increase	Calculated CAGR
Internet subscribers	238.71 million, Dec. 2013	936.16 million, Dec. 2023	292.17%	14.64%
Broadband subscribers	55.20 million, Dec. 2013	904.54 million, Dec. 2023	1,538.66%	32.27%
Total digital-payment transactions	2,071 crore, FY 2017–18	13,462 crore, FY 2022–23	550.02%	45.41%
UPI transaction volume	92 crore, FY 2017–18	8,375 crore, FY 2022–23	9,003.26%	146.51%
UPI transaction value	₹1 lakh crore, FY 2017–18	₹139 lakh crore, FY 2022–23	13,800%	168.29%

As of 31 December 2013, there were 238.71 million internet subscribers in India, of which 55.20 million subscribers were broadband subscribers. At that time, Maharashtra had the highest number of telecom service areas, with 38.77 million internet subscriptions. As of December 2023, India had 936.16 million internet subscribers and 904.54 million broadband subscribers. The Maharashtra telecom service area had 79.14 million internet subscriptions and 86.12 subscriptions per 100 people.

The growth of broadband far exceeded growth in total Internet subscriptions. In the last 10 years, broadband accounted for a share of 23.12% of all internet subscriptions as of December 2013, and 96.62% as of December 2023. Through the improvement of basic connectivity, communication is possible, and with high-speed connectivity, cloud applications, online video marketing in real time, remote working, digital design, software-as-a-service, and real-time inventory systems are possible as well—all of which are commercially significant.

Things were even more dynamic in the payments landscape. In 2017–18, the volume of transactions through the UPI platform was 2,071 crore, whereas in 2022–23, it rose to 13,462 crore. The volume of UPI transactions grew from 92 crore to 8,375 crore, and volume value increased from ₹1 lakh crore to ₹139 lakh crore. UPI's transaction volume growth was the largest, and it's a simple platform for even small businesses to accept account-to-account payments at a low cost.

This setting may help Nagpur SMEs to achieve better performance by accelerating collections, reducing cash handling, keeping transaction records, and providing ease for customers. An electronic record of transactions can also be used for cash flow analysis for credit evaluation. The proliferation of national payment infrastructure does not mean that all Nagpur enterprises embraced it and gained an equal benefit.

6.3 Growth of digital enterprise formalisation

The Udyam Registration Portal was launched on 1st July 2020, which is a paperless and online system following the principle of self-declaration. To enable informal microenterprises to become formal, the Udyam Assist Platform was launched on 11th January 2023. Both systems are linked to registration and benefits for priority sector lending and government MSME benefits.

Table 3
Udyam registrations in Nagpur during 2023

Category	27 January 2023	4 December 2023	Absolute increase	Percentage increase
Micro	110,504	157,865	47,361	42.86%
Small	3,423	4,407	984	28.75%
Medium	378	518	140	37.04%
Total	114,305	162,790	48,485	42.42%

Source: Author's calculations from two Ministry of MSME parliamentary annexures.

As of December 2023, 96.97% of the total Udyam registrations in Nagpur were microenterprises. With the exception of small and medium enterprises, only a small fraction of

businesses accounted for less than 3% of the total. The small and medium enterprises accounted for only 0.32% and 2.71%, respectively. The outcome reveals that the enterprise economy in Nagpur is still overwhelmingly a micro one, even after being formalized by the digitization process.

In December 2023, Nagpur was the sixth largest district in the state with the highest number of Udyam registrations in Maharashtra after Pune, Thane, Mumbai Suburban, Mumbai, and Nashik. It accounted for around 4.43% of Maharashtra registrations during January and 4.44% in December. The Maharashtra state total registrations rose from 2,578,695 to 3,669,345, which is a 42.29% growth in registrations in Maharashtra state. Nagpur's growth of 42.42% was more or less in line with the state trend as compared to the figures.

This discovery has two ramifications. First, the formalization process was greatly simplified with digital documentation, and more entrepreneurs became visible to government and lenders. Second, the share of the state as a whole has not declined in Nagpur, meaning that much of the rise was due to policy and platform expansion across the state and less to a 'local transformation,' as the rise in state share has not been particularly large.

The performance can be indirectly improved by formalization. Registered firms can have access to schemes, enter into procurement, are formally recognized as creditworthy, and have credibility with corporate customers. However, more registrations are not necessarily the same number of outputs or jobs. Some registrations were for existing informal businesses that came into light, not new businesses.

6.4 Digital formalisation and institutional finance

Eliminating information asymmetry between SMEs and lenders can be achieved using digital identity, bank statements, tax returns, and transaction records. PMMY data are available to measure the district-level reach of microenterprise credit, but the scheme does not have to be digital.

Nagpur had 2,174,345 PMMY loan accounts with a total disbursement of ₹10,300.89 crore between April 2016 and 27 January 2023. The average disbursement (implied) was around ₹47,375 for each account. In the annexure, PMMY accounts were the most in Nagpur among the individual named districts of Maharashtra.

Table 4
Selected formalisation and credit indicators for Nagpur

Indicator	Value
Udyam registrations, December 2023	162,790
Share of Maharashtra Udyam registrations	4.44%
PMMY loan accounts, April 2016–January 2023	2,174,345
PMMY cumulative amount	₹10,300.89 crore
Average amount per PMMY account	₹47,375
PMMY accounts per December 2023 Udyam registration	13.36

The last ratio is not to be understood as 13 loans per registered firm. The periods are different; PMMY loans are provided to those who have availed them before, and there are many beneficiaries who may not have been enrolled in Udyam. It, however, illustrates the extent of formal microcredit as compared to enterprise registration in the digital register.

With digital transformation, credit can be enhanced with electronic applications, bank account information, GST records, and payment history. World Bank research notes that a more comprehensive understanding of a company's cash flow can be gained through sales, collections, payment patterns, and digitized accounts, which can bolster information for lenders of MSMEs.

6.5 District-level statistical analysis

The test of association between PMMY accounts and Udyam registration in the month of December 2023 was conducted in 36 districts of Maharashtra.

Table 5
Correlation between Udyam registrations and PMMY loan accounts

Test	Coefficient	Probability value	Interpretation
Pearson correlation	$r = 0.4092$	$p = 0.0132$	Moderate positive linear association
Spearman rank correlation	$\rho = 0.5985$	$p = 0.00012$	Stronger positive rank association
Log-transformed Pearson correlation	$r = 0.5298$	$p = 0.00089$	Significant after adjusting for scale

Source: Author's calculations from official district-wise Udyam and PMMY annexures.

Results show that there was a correlation between the number of digitally registered enterprise bases in districts and the number of PMMY loan accounts. Using district rankings and logarithmic values, it was still important.

This is in line with the positive correlation that was found between formalization and credit visibility. It can, however, prove that it was Udyam registration that led to the rise in loans. The volume of businesses, industrial concentration, banking systems, population, and urbanization could lead to more numbers of registrations and loans.

7. Findings of the Study

The city of Nagpur had a good base of small and medium enterprises (SMEs) with over 10,000 registered small and medium enterprises, providing employment to over 106,000 people at the start of this study. India's internet subscriptions increased almost fourfold between December 2013 and December 2023, while broadband subscriptions increased more than sixteenfold. Digital-payment infrastructure grew much faster than connectivity in general. UPI transaction volume increased from 92 crore in 2017–18 to 8,375 crore in 2022–23. The number of Udyams registered in Nagpur rose by 42.42% during January-December 2023.

The small enterprises in Nagpur had the highest percentage of enterprise base registered digitally, with 96.97% of the total being microenterprises. Nagpur retained the same percentage of Udyam registrations in the state, around 4.44%. Its growth rate mirrored the state's and did not reflect anything special—moreover, it reflected strong representation across the state in the formalization process. The registration system was fully digital, which made it easier to discover previously informal and formal operations, but this does not imply a direct correlation between the number of registrations and business creation. In Nagpur alone, over 2.17 million PMMY accounts were registered, and a cumulative disbursement of ₹10,300 crore was achieved.

The association of Udyam registrations and PMMY accounts was positive and statistically significant. Digital transformation likely has enhanced payment speed, record keeping, customer convenience, market communication, and visibility of credit but does not yet prove to be a definite impact on profit, employment, or productivity.

8. Discussion

Analysis reveals that digital transformation had a positive effect on the operating environment of Nagpur SMEs over the years 2013 - 2023. The expansion of internet accessibility, broadband connection, and digital payments facilitated even small businesses to accept real-time payments, communicate with customers, promote products online, and keep electronic records. Digital tools enhanced the operational efficiency, cutting down transaction delays and cash-handling costs and supplying better financial information. Online catalogs, social media, and e-commerce platforms opened up market opportunities beyond the local boundaries, and digital procurement systems opened up access to institutional buyers. But to be effective, there's a need for skills in digital documentation, accounting, and running a business online, as well. Digital use has been growing due to the COVID-19 pandemic as companies shifted to online ordering and digital payments for communication. The surge in Udyam registrations is a testament to the significance of digital public infrastructure, making the formal registration process easier and unlocking access to government schemes and finance. But growing numbers of registers do not show sophisticated digital skills.

The digital maturity gap between micro and larger enterprises is still a huge challenge. Although some companies implement high-tech systems, most only use rudimentary digital payments. There are also cybersecurity risks, as well as minimal skills, and/or data protection needs to be addressed. Digital training, security awareness, and performance measurement through indicators like employment or turnover, productivity, or the survival of enterprises should be the focus of future policies.

9. Hypothesis Testing

The results of the hypothesis testing for the growth of digital transformation and formalization are also positive, showing an increase in both dimensions over the study period. For Hypothesis 1, the number of internet subscriptions grew from 238.71 million to 936.16 million with a CAGR of 14.64%, which is higher than the set benchmark; thus, H_{11} was accepted and H_{01} was rejected, suggesting that there has been a significant increase in digital infrastructure. In the case of Hypothesis 2, the number of Udyam registrations rose from 114,305 in January 2023 to 162,790 in December 2023, with an increase of 42.42%, which was higher than the benchmark; thus, H_{02} was rejected and H_{12} was accepted. This is, however, an indication of the growth in registration coverage and not necessarily of the number of active enterprises. In the case of Hypothesis 3, the relationship between Udyam registrations and PMMY loan accounts was positive and statistically significant, with Pearson's $r = 0.4092$ ($p = 0.0132$) and Spearman's $\rho = 0.5985$ ($p = 0.00012$). Therefore, the hypothesis H_{03} was rejected and H_{13} was accepted, implying that there is a positive association between access to institutional microcredit and digital formalization of districts, but not causation.

10. Conclusion

In the next 10 years, 2013-2023, the technological landscape of Nagpur SMEs underwent a significant transformation. Conditions for enterprise formalisation, financial access and market participation have been enhanced through expansion of internet access, digital payments, online taxation systems and digital registration systems. As of December 2023, Nagpur has 162,790 registered Udyams, which form a significant digitally visible enterprise base. Digital transformation helped SMEs in a number of ways. Digital payments cut down on transaction delays and cash management costs, and online registration enhanced business recognition. Social media, e-commerce and electronic records strengthened customer reach, accounting practices and credit assessment. The positive association between the numbers of Udyam registrations and PMMY credit accounts suggests that businesses that were digitally formalised were likely to have better access to institutional finance. But these results need to be interpreted with caution. Growth in registrations is not necessarily an indicator of the creation of new businesses but also of formalisation and the reclassification of MSMEs that are now classified as informal businesses due to the inclusion of such businesses on platforms like Udyam Assist. There is no secondary data available which is directly measuring productivity and profits or enterprise survival. Thus, digital transformation should not be solely credited as the catalyst to SME growth. There is a need for deeper digitisation through training in accounting software, e-commerce, cybersecurity, data analytics, etc. so that future policies can encourage this. The technology, along with the managerial skills, finance and infrastructure, will help Nagpur SMEs to grow in a sustainable way and be competitive.

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